INTERNATIONAL STANDARD

ISO 3624

Second edition
1994-11-01

Photography — Processing chemicals — Specifications for potassium ferricyanide

Photographie — Produits chimiques de traitement — Spécifications pour le ferricyanure de potassium

Reference number
ISO 3624:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 3624 was prepared by Technical Committee ISO/TC 42, *Photography*.

This second edition cancels and replaces the first edition (ISO 3624:1976), which has been technically revised.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

0.1 This International Standard is one of a series that establishes criteria of purity for chemicals used in processing photographic materials. General test methods and procedures cited in this International Standard are compiled in ISO 10349-1.

This International Standard is intended for use by individuals with a working knowledge of analytical techniques which is possibly not always the case. Some of the procedures utilize caustic, toxic or otherwise hazardous chemicals. Safe laboratory practice for the handling of chemicals requires the use of safety glasses or goggles, rubber gloves and other protective apparel such as face masks or aprons where appropriate. Normal precautions required in the performance of any chemical procedure should be exercised at all times but care has been taken to provide warnings for hazardous materials. Hazard warnings designated by a letter enclosed in angle brackets, <>, are used as a reminder in those steps detailing handling operations and are defined in ISO 10349-1. More detailed information regarding hazards, handling and use of these chemicals may be available from the manufacturer.

0.2 This International Standard provides chemical and physical requirements for the suitability of a photographic-grade chemical. The tests correlate with undesirable photographic effects. Purity requirements are set as low as possible consistent with these photographic effects. These criteria are considered the minimum requirements necessary to assure sufficient purity for use in photographic processing solutions, except that if the purity of a commonly available grade of chemical exceeds photographic processing requirements and if there is no economic penalty in its use, the purity requirements have been set to take advantage of the availability of the higher-quality material. Every effort has been made to keep the number of requirements to a minimum. Inert impurities are limited to amounts which will not unduly reduce the assay. All tests are performed on samples "as received" to reflect the condition of materials furnished for use. Although the ultimate criterion for suitability of such a chemical is its successful performance in an appropriate use test, the shorter, more economical test methods described in this International Standard are generally adequate.

Assay procedures have been included in all cases where a satisfactory method is available. An effective assay requirement serves not only as a safeguard of chemical purity but also as a valuable complement to the identity test. Identity tests have been included whenever a possibility exists that another chemical or mixture of chemicals could pass the other tests.

All requirements listed in clause 4 are mandatory. The physical appearance of the material and any footnotes are for general information only and are not part of the requirements.

0.3 Efforts have been made to employ tests which are capable of being run in any normally equipped laboratory and, wherever possible, to avoid tests which require highly specialized equipment or techniques. Instrumental methods have been specified only as alternative methods or alone in those cases where no other satisfactory method is available.

Over the past few years, great improvements have been made in instrumentation for various analyses. Where such techniques have equivalent or greater precision, they may be used in place of the tests described in this International Standard. Correlation of such alternative procedures with the given method is the responsibility of the user. In case of disagreement in results, the method called for in the specification shall prevail. Where a requirement states "to pass test", however, alternative methods shall not be used.

Photography — Processing chemicals — Specifications for potassium ferricyanide

1 Scope

This International Standard establishes criteria for the purity of photographic-grade potassium ferricyanide and describes the tests to be used to determine the purity.

2 Normative reference

The following International Standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10349-1:1992, *Photography — Photographicgrade chemicals — Test methods — Part 1: General.*

3 General

3.1 Physical properties

Potassium ferricyanide, $K_3Fe(CN)_6$, exists in the form of red crystals, fine granular crystals or a crystalline powder. It has a relative molecular mass of 329,27.

3.2 Hazardous properties

Potassium ferricyanide is moderately toxic. Avoid inhalation and ingestion. When heated to decomposition or exposed to acid or acid fumes, it will emit highly toxic cyanide fumes.

3.3 Handling and storage

No special precautions are required for the handling or storage of potassium ferricyanide except that contact with strong acids and exposure to high heat shall be avoided.

4 Requirements

A summary of the requirements is shown in table 1.

5 Reagents and glassware

All reagents, materials and glassware shall conform to the requirements specified in ISO 10349-1 unless otherwise noted. The hazard warning symbols used as a reminder in those steps detailing handling operations are defined in ISO 10349-1. These symbols are used to provide information to the user and are not meant to provide conformance with hazardous labelling requirements as these vary from country to country.

Table 1 — Summary of requirements

Test	Limit	Subclause	International Standard in which test method is given
Assay [as $K_3Fe(CN)_6$]	99,0 % (*m/m*) min.	7.1	ISO 3624
Appearance of solution	Clear and free from insoluble matter except for a slight flocculence	7.2	ISO 3624
NOTE — *m/m* = mass/mass.			

6 Sampling

See ISO 10349-1.

7 Test methods

7.1 Assay [as $K_3Fe(CN)_6$]

7.1.1 Specification

Content of $K_3Fe(CN)_6$ shall be 99,0 % (*m/m*) min.

7.1.2 Reagents

7.1.2.1 Acetic acid, glacial, CH_3COOH (DANGER:<C><B>)[1].

7.1.2.2 Potassium iodide, KI.

7.1.2.3 Zinc sulfate, $ZnSO_4$, standard volumetric solution of 1,00 mol/l (161,4 g/l).

Dissolve 287,5 g ± 0,1 g of zinc sulfate heptahydrate ($ZnSO_4 \cdot 7H_2O$) in 500 ml of water in a 1 litre volumetric flask. Dilute to the mark with water.

7.1.2.4 Sodium thiosulfate, $Na_2S_2O_3$, standard volumetric solution of 0,100 mol/l (15,8 g/l)[2].

7.1.2.5 Salicylic acid, HOC_6H_4COOH, 1 % (10 g/l).

7.1.2.6 Starch indicator, 5 g/l.

Stir 5 g of soluble starch into 1 ml of the salicylic acid (7.1.2.5). Add 300 ml to 400 ml of boiling water and boil until the starch dissolves. Finally dilute to 1 litre with water.

7.1.3 Apparatus

7.1.3.1 Burette, of 50 ml capacity.

7.1.4 Procedure

Weigh, to the nearest 0,001 g, a test portion of about 1,3 g. Dissolve it in 50 ml of water in a glass-stoppered flask and add 3 g of potassium iodide (7.1.2.2). Add 2 ml of the acetic acid (7.1.2.1) (<C><B>) and 20 ml of the zinc sulfate (7.1.2.3). Stopper the flask and shake thoroughly. Immediately titrate the liberated iodine with the sodium thiosulfate (7.1.2.4), adding the starch indicator (7.1.2.6) near the end of the titration procedure.

7.1.5 Expression of results

The assay, expressed as a percentage by mass of potassium ferricyanide [$K_3Fe(CN)_6$], is given by

$$32{,}92 \cdot c \cdot V/m$$

where

c is the actual concentration, expressed in moles per litre, of the sodium thiosulfate (7.1.2.4);

V is the volume, in millilitres, of the sodium thiosulfate solution used to reach the titration endpoint (7.1.4);

m is the mass, in grams, of the test sample;

32,92 is a conversion factor obtained from the mass of potassium ferricyanide equivalent to 1 mole of sodium thiosulfate (i.e. 329,2) × the conversion factor for millilitres to litres (i.e. 0,001) × 100 (for percentage).

7.2 Appearance of solution

7.2.1 Specification

The solution shall be clear and free from insoluble matter except for a slight flocculence.

7.2.2 Procedure

Prepare a 100 g/l solution of the test sample. Observe this solution for clarity and any sediment.

1) Hazard warning codes are defined in ISO 10349-1.

2) Commercially available analysed reagent is recommended. If solutions are to be prepared, see any quantitative analytical chemistry text.